Modern Roundabouts

Understanding Your Design Vehicle

Friday, September 26, 2014
10:30 AM-12:00 PM Session 5B

Dana LeClaire – Kimley-Horn and Associates, Inc.
The Design Challenge

• Speed Control, Especially Smaller Vehicles
• Accommodate Large Trucks
• Don’t Impact Response Time For Emergency Vehicles
• Safe Transitions For Bicycles
• Safe Crossings For Pedestrians
• ADA Considerations
Can The Design Accommodate:

Passenger Vehicles and Large Vehicles, Emergency Vehicles, Pedestrians, Bicycles, Strollers, Wheelchairs, Groups etc…
Passenger Vehicles

- Recent Car Advertisements Compare To Race Cars

- Importance Of Speed Control For Smaller Vehicles
Emergency Vehicles

- Consult With Emergency Personnel
- Manufacturer Specifications
- May Need A Custom AutoTurn Template
Emergency Vehicles

AutoTURN Bus-40
Wheelbase = 26’

E-One HP 100
Wheelbase = 19’

Both Vehicles Are 40’ Overall Length

Resource: http://www.e-one.com/ & AutoTURN
Emergency Vehicles

48’ Overall Length
28’ Wheel Base

Emergency Vehicles

**HP100 Super Tiller**

Front & Rear Steering – 58’ Overall Length
32’ Wheel Base

Emergency Vehicles

Other Emergency Vehicle Manufactures:
Pierce
Freightliner – Builds Busses and Fire Trucks
American LaFrance

Resource:
http://www.freightlinertrucks.com/
http://americanlafrance.com/
Large Trucks

- Consider Trailer Lengths & Clearances
- Stay In Lane or Take Two Lanes
- Don’t Build Obstructions Behind The Apron
Some Reasons For Truck Accidents In Roundabouts

- Tangent High Speed Approaches (Driver Fails to Reduce Speed)
- Lack Of Deflection
- Sudden Tightening Of Radii Part Way Through The Intersection
- Clear Driver Visibility With Absence Of Approaching Vehicles
- Low Circulating Traffic, No Need To Yield, Faster Entry Speed
- Tight Curb Geometry And Small Circle Diameter
- Moving or Liquid, Partial Load Cargo
- Grading
A Quick Comparison

Single Lane Roundabout

- Passenger Vehicle
- Fire Truck
- WB-50 Truck

Resource: NCHRP Report 672, Roundabouts: An Informational Guide
Second Edition
# Selecting The ICD

<table>
<thead>
<tr>
<th>Roundabout Configuration</th>
<th>Typical Design Vehicle</th>
<th>Common Inscribed Circle Diameter Range*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-Roundabout</td>
<td>SU-30 (SU-9)</td>
<td>45 to 90 ft (14 to 27 m)</td>
</tr>
<tr>
<td>Single-Lane Roundabout</td>
<td>B-40 (B-12)</td>
<td>90 to 150 ft (27 to 46 m)</td>
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<tr>
<td></td>
<td>WB-50 (WB-15)</td>
<td>105 to 150 ft (32 to 46 m)</td>
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<tr>
<td></td>
<td>WB-67 (WB-20)</td>
<td>130 to 180 ft (40 to 55 m)</td>
</tr>
<tr>
<td>Multilane Roundabout (2 lanes)</td>
<td>WB-50 (WB-15)</td>
<td>150 to 220 ft (46 to 67 m)</td>
</tr>
<tr>
<td></td>
<td>WB-67 (WB-20)</td>
<td>165 to 220 ft (50 to 67 m)</td>
</tr>
<tr>
<td>Multilane Roundabout (3 lanes)</td>
<td>WB-50 (WB-15)</td>
<td>200 to 250 ft (61 to 76 m)</td>
</tr>
<tr>
<td></td>
<td>WB-67 (WB-20)</td>
<td>220 to 300 ft (67 to 91 m)</td>
</tr>
</tbody>
</table>

* Assumes 90° angles between entries and no more than four legs. List of possible design vehicles is not all-inclusive.

**TYPICAL ICD RANGES**

Resource: NCHRP Report 672, Roundabouts: An Informational Guide
Second Edition
Passenger Vehicle Simulation Using AutoTURN

By Transoft Solutions
City Bus Simulation Using AutoTURN

By Transoft Solutions
City Bus Simulation Using AutoTURN

By Transoft Solutions
Kansas

Resource: Google Earth
100' ICD
17' Circulating Lane
10' Truck Apron
Large Truck Crash

Resource: Google
Large Truck Crash

Resource: Google
TRUCK APRON IS TOO SMALL

WALL WAS CONSTRUCTED WHERE TRUCK APRON WAS NEEDED

ICD IS TOO SMALL FOR TRUCKS

Single-Lane Roundabout

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Kimley-Horn
Rollover of Heavy Commercial Vehicles
University of Michigan Transportation Research Institute
Examples Of Moving Cargo

- Bulk Liquid Trailers Partially Filled
- Refrigerated Trailers With Hanging Meat
- Livestock Trailers
3D Model – Bulk Liquid Container Trucks
3D Model – Bulk Liquid Container Trucks
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DESIGN MUST

Reduce Speed On The Entry
Provide Deflection
Roadway & Truck Apron Grading
Minnesota DOT and Wisconsin DOT Sponsored
Transportation Engineering and Road Research Alliance (TERRA)

Roundabout Comparison

Resource: Google Earth
Early Design, Experienced Several Rollovers
140’ ICD
LONG TANGENT APPROACH
14’ WIDE APPROACH LANES
TWO 16’ WIDE CIRCULATING LANES

Designed For Trucks To Stay In Lane
220’ ICD
LARGE RADIUS APPROACH
WIDER APPROACH LANES WITH PAINTED GORE
14’ AND 20’ CIRCULATING LANES
Fort Worth - Arborlawn Drive and Bellaire Drive

ICD = 140’
Circulating Lanes = 30’ and 18’
Entry Lanes = 13’ and 14’
WB-50 Needs to Use Both Lanes to Maneuver Through the Roundabout
Fort Worth Arborlawn Drive and Bellaire Drive

ICD = 180'
Circulating Lanes = 30'
Entry Lanes = 13' and 14'
WB-50 Can Stay In-Lane
Fort Worth - Bellaire Drive and Ranch View Road

ICD = 110’
Circulating Lanes = 20’
Fire Truck Can Stay In-Lane
Fort Worth - N. Riverside Drive and Northern Cross BLVD

ICD = 175'
Circulating Lanes = 30'
Enter Lanes - 12' Lanes with Truck Gore
WB-50 Can Stay In-Lane
Fort Worth N. Riverside Drive and Northern Cross BLVD

ICD = 140’
Circulating Lanes = 29’ and 20’
WB-50 and Horse Trailers can Stay In-Lane
3D Model – Oversized & Overweight Trucks
3D Model – Oversized & Overweight Trucks
Questions